

DOCUMENT RESUME

ED 262 093

TM 850 574

AUTHOR Shaughnessy, Michael F.
TITLE What's New in I.Q.? A Contemporary Analysis with Implications for Gifted/Talented/Creative.
PUB DATE Apr 85
NOTE 17p.; Paper presented at the Anniversary Meeting of the National Association of Creative Children and Adults (10th, Cincinnati, OH, April 14-16, 1985).
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Ability Identification; *Cognitive Measurement; Cognitive Processes; *Cognitive Tests; *Creativity Tests; Elementary Secondary Education; Intelligence Differences; Intelligence Quotient; *Intelligence Tests; Kinesthetic Perception; Learning Processes; Mathematics Skills; Memory; Nonverbal Ability; Psychological Testing; Researchers; Spatial Ability; *Talent Identification; Verbal Ability
IDENTIFIERS Feuerstein (Reuven); Gardner (Howard); Kaufman Assessment Battery for Children; Learning Potential Assessment Device; Sternberg (Robert)

ABSTRACT

Recent theorists have begun to re-conceptualize the construct of "intelligence." This paper reviews recent theories of intelligence and indicates implications for practitioners, educators, and individuals. Theories and theorists discussed include the following: (1) Robert Sternberg has advanced the "triarchic theory" of intelligence with three subtheories (componential sub-theory, experiential sub-theory, and a contextual sub-theory). Of particular importance for education are Steinberg's conception of "insight," his components of "knowledge acquisition," and his conception of "automaticity." (2) Howard Gardner has indicated that there is no single intelligence, but that there are several types. These include linguistic, logical, mathematical, visual and spatial conceptualizations, body kinesthetic skills, inter-personal abilities and intra-personal knowledge. (3) Warren Dohemann and Melvin Suhd have removed emphasis from higher theoretical aspects of intelligence to the practical matters of learning and education. They point toward growth and the maximization of intelligence through the curriculum. (4) Alan and Nadine Kaufman have developed the Kaufman Assessment Battery for testing of sequential and simultaneous processing, in an effort to integrate theory and practice. (5) Feuerstein's Learning Potential Assessment Device also has a strong theoretical foundation. (6) Thorndike has advocated an information processing point of view toward intelligence. His processing perspective encompasses long and short term memory, neuristics, and speed of processing. (LMO)

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Paper presented at the 10th Anniversary Meeting of the National Association of Creative Children and Adults, April 14-16, 1985, Cincinnati, Ohio

ED262093

What's New In I.Q.?
A Contemporary Analysis with Implications for
Gifted/Talented/Creative

Michael F. Shaughnessy
Eastern New Mexico University
Psychology Department
Portales, New Mexico 88130

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Abstract

The concept of "intelligence" or I.Q. has been with us for decades. However, recent theorists have begun to re-conceptualize the construct of "intelligence" and have begun to formulate new, more integrative theories. This paper reviews the most recent theories of intelligence and indicates implications for practitioners, educators and gifted/talented/creative individuals in this area..

Intelligence has occupied a major role in psychology, education and testing for the past eighty-five years. Since Alfred Binet attempted to differentiate between Parisian children who could benefit from education, from those who could not, the realm of I.Q. has dominated modern day psychology. Binet's conceptualization of "mental age" relative to chronological age has been the foundation for evaluation and placement relative to I.Q. David Wechsler, building upon Binet's ideas and the test we now know as the Stanford Binet, has contributed the W.P.P.S.I., W.I.S.C.-R. and W.A.I.S.-R. for the intellectual evaluation of pre-school and primary children, children and adults respectively.

Yet, what exactly is being "measured," "tapped," or "tested?" All too often, intelligence has been seen to be what the intelligence tests measure (Boring, 1923; Jensen, 1969). This circular definition is unacceptable! Science, logic, reason and rationality dictate that empiricists should have a definition or a theory for that which they are investigating. Yet, we continue to test and place children on the basis of tests which have no underlying theory of intelligence.

Recently, however, several theorists and psychologists have endeavored to confront this problematic lack in psychology. These theorists, their tests, and implications will be examined forthwith.

Sternberg's Triarchic Theory of Human Intelligence

Robert Sternberg of Yale University has attempted to go "beyond I.Q." with his "triarchic theory" of human intelligence.

Advancing beyond the verbal/performance dichotomy inherent in the Wechsler scales, Sternberg has postulated the existence of three sub-theories of intelligence: 1) componential sub-theory; 2) experiential sub-theory; and 3) contextual sub-theory.

The componential sub-theory, in effect, deals with three sub-strata, i.e., metacomponents (problem solving strategies), performance components and finally, and perhaps most importantly for education, knowledge acquisition components.

The componential sub-theory is comprised of two theories relative to the fluid and crystallized abilities dichotomy. In terms of fluid abilities Sternberg offers his ideas about induction and deduction specifically relevant to information processing and response choice. Then, in the "crystallized abilities" domain, theories of knowledge acquisition and of real-time processing are offered. Furthermore a theoretical structure for mediating variables, representation and processing is elaborated upon. Drawing upon research done by himself and his colleagues at Yale, Sternberg specifies tests which could be utilized to tap or measure said theoretical aspects of development.

Sternberg's experiential sub-theory deals with one's ability to cope with new, novel, and divergent situations and one's ability to automatize information processing. This has been referred to as "nonentrenchment." The final contextual sub-theory addresses practical and social intelligence respectively. In this sub-theory the using of tacit knowledge and one's ability to decode nonverbal cues becomes imperative.

Sternberg provides empirical support for his position with statistics and research studies. Of particular importance for education are his conceptions of "insight" in the gifted, and the components of "knowledge acquisition" (essentially what is imperative in educational systems) and finally, his conception of "automaticity" (the ability to process information automatically).

Gardner's "Frames of Mind"

Howard Gardner has also indicated that there is no single "intelligence" but instead that there are several types. These types include linguistic, logic, and mathematical, visual and spatial conceptualizations, bodily kinesthetic skills, interpersonal abilities and intra-personal knowledge. According to Gardner (1983) each one of these intellectual realms has its own specific memory, its own mechanisms of learning and each form has its own relevant history of development.

Essentially, in the United States, certain forms of "intelligence" are highly valued. In our culture, math, language, logic and vocabulary are highly prized and measured by such "traditional" tests as the W.I.S.C.-R. and the Stanford Binet. In other societies, other abilities are more highly prized, e.g., bodily-kinesthetic skills, musical abilities and artistic competencies.

Each form of intelligence has its own components and aspects central to its development. Linguistic intelligence (as exemplified by writers, poets, political speakers and the like) require sophisticated syntax, precise phonology and excellent explanatory

skills. Citing Jean-Paul Sartre as one who personified linguistic excellence, Gardner integrates the importance of memory in the development of writers and playwrights.

Gardner's writing exemplifies the precision and syntactic complexity to which he refers. The synthesis of words and ideas combines to communicate the breadth and depth of human emotion in sublime fashion. Further, memory for nuances of experience and the verbiage of other, greater writers is imperative and the selective memory for the flowing antecedental phrases and words of the great poets and writers lends itself to successful writing.

Musical intelligence comprises composing, competence in music, a "good ear" for pitch and rhythm, and according to Gardner, "adequate or lavish genetic background" (p. 112). Differentiation between composing music and performing music is noted, and "personality" is offered by Gardner as the explaining intervening variable.

Logical-mathematical intelligence is built upon Jean's Piaget's foundational perspective and encompasses math, science and logic. This form of intelligence draws upon different aspects. For mathematicians, the crux is his/her ability to cope adroitly with several strands of reasoning. Gardner draws upon many thinkers to explain "the mathematical intellect"--Adler for personality and abstraction, Poincare', reasoning, and Von Neumann, form. In the realm of science (tied inextricably to math) intuition appears central--to pose Newtonian questions and ponder as Einstein did, what it would be like to ride on a beam of light!

Spatial intelligence could be defined as the ability to imagine an internalized mental image and deal with it. Gardner indicates that

central to spatial intelligence are the capacities to perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions and to be able to re-create aspects of one's visual experience, even in the absence of relevant physical stimuli (p. 173).

The aforementioned abilities have been present in such exquisite artists as da Vinci, Michelangelo and Raphael.

"He flies through the air with the greatest of ease, the daring young man on the flying trapeze" may be a manifestation of bodily kinesthetic intelligence just as the basketball dunking skills of "Dr. J" and the hockey skills of Wayne Gretzky may be seen as higher forms of this I.Q. So, too, must we examine the ballet of Mikhail Baryshnikov, the choreography of George Balanchine and the mime skills of Marcel Marceau. Each of these doyens in their fields have developed their "bodily intelligence" in a specific realm. Others too, find expression in other areas--acting, dance, imitation and in the graceful expression of one's body. This bodily intelligence is, of course, an amalgam of many aspects--awareness, non-verbal communication--speed, power, drive and emotion. Skill, talent, precocity, practice are all words that have been used to explain this phenomenon. As a specific skill, however, it is certainly separate from one's ability to perform trigonometric functions.

Finally, there are two "personal intelligences," one salient to the internal aspects of an individual--one's ability to be in touch with one's own inner feeling life--one's affective state

and emotions; the second germane to others--the ability to note others and to discriminate between other individuals. Interpersonal intelligence is often found in charismatic leaders and religious personages--the dynamic John F. Kennedy, the wise Dr. Martin Luther King, Jr., and Ghandi. Diplomacy, compromise, manipulation are manifestations of inter-personal intelligence; whereas introspection, awareness, and affective awareness, embodies intra-personal intelligence. Providing a cultural scenario, Gardner explains the personal intelligences with vignettes from the cultures of Morocco, New Zealand and Sudan. The internal intelligence (jikkai in Japanese) is almost a Rogerian "authentic" self-in-touch-with-one's-being in the phenomenological sense, while the inter-personal is Sullivanian in nature.

Gardner's perspective clearly views intelligences as separate, unique and having their own developmental history and life cycle, if you will. For neuropsychologists, Gardner delves into specific brain locations for the various intelligences and examines abnormalities resulting from trauma to bolster his position. The implications of Gardner's work are many. What Gardner has accomplished is nothing short of a Copernican switch. Instead of examining I.Q. from one numerical perspective, we now must take a wider vista. Rather than being ethnocentrically oriented, we must take into account other neglected domains of other abilities which may be more predominant in other cultures. Gardner's prosaic work is also a testimonial to his own power of command of language. His work lacks the statistical precision of Sternberg's but compensates in multidisciplinary cultural richness.

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The Alchemy of Intelligence

Alchemy, the transmutation of base metals into gold, was a metaphor often used by Carl Jung and often misused by those who misunderstood his theories. In Warren Dohemann and Melvin Suhd's book, The Alchemy of Intelligence, emphasis is removed from the higher theoretical aspects of intelligence to the practical matters of learning and education. The alchemical transformation is the change from ignorance to knowing, from curiosity to learning. Intelligence can be seen as the process of growth--"theorizing, practicing and integrating"--knowledge about "ourselves, society, the environment and communication arts" and the aspects directly related to our "goals, our resources, institutional organizations and evaluative process" (p. 175).

Taking a humanistic point of view, Dohemann and Suhd point toward growth and the maximization of intelligence through the curriculum (which can be conceptualized as academic, experimental, technical and pragmatic). Dohemann and Suhd's concern about education and learning is apparent. Their concern about our intellects and what we do with our gray matter is even more apparent. Their theorizing, however, covers the waterfront and is not as compact as Sternberg's nor as erudite as Gardner's. Dohemann and Suhd's definition of intelligence is simply from Webster, i.e., "the ability to learn or understand from experience, the ability to acquire or retain knowledge, the ability to respond quickly and successfully to a new situation." The alchemy of intelligence, however, is "my power to change, to grow, to evolve into a higher more complex version of myself" (Dohemann and Suhd, 1984 vii).

The aforementioned goal is desirable, and it would appear that Dohemann and Suhd are well on their way toward that goal. However, specifics for the attainment of these goals are lacking. Many general, nebulous statements regarding the curriculum, education and motivation are made (all of which are important) but these lead to no synthesis of the three for educational attainment of or achievement. Although Dohemann does not want to be known as a "touchy feely" his text and theories may lead others to conclude otherwise. But perhaps the human dimension does not need to be kept in mind during this erudite cognitive safari into a theoretical morass. Dohemann, idealist that he may be, unfortunately refers to "society" too often for implementation of his tetrahydronal model. Methinks he needs a good dose of reality testing.

Intelligence: The Processing of Information?

Unlike the three aforementioned theories of intelligence, one perspective has defined intelligence and then has gone on to construct a "test" of their theory. Alan and Nadine Kaufman (1983) have defined intelligence as "the ability to process information effectively as a means of solving unfamiliar problems," and have constructed the Kaufman Assessment Battery for children (K-ABC) for the testing of sequential and simultaneous processing. The sequential/simultaneous dichotomy has been referred to by other researchers by various other nomenclatures such as "serial and multiple," "time ordered and time independent," "propositional and appositional," and "analytic and gestalt/holistic." The K-ABC endeavors to "tap" or measure various

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sub-components of the simultaneous/sequential dichotomy. However, the sub-tests that purportedly measure "sequential processing" are vaguely similar to many of the sub-tests on the WISC-R. A "digit-span" test is part of the "sequential" processing component of the K-ABC and a "picture arrangement" type task is in the sequential category. Such similarities and various tests tapping short-term memory (face recognition and spatial memory) and resistance to interference (word order) will be familiar to most psychometricians. Seriation and analogical reasoning are also recognizable components of the K-ABC. Perhaps most desultory to many children will be the attentional component of the K-ABC. Most of the sub-tests rely heavily on the child's attention span, ability to concentrate and their freedom from distractibility.

In sum, however, the Kaufmans have endeavored to integrate theory and practice and have offered a test based specifically on their theory. The usefulness of the K-ABC to classroom teachers has yet to be determined.

Feuerstein's Learning Potential Assessment Device

Another recent test has been developed, which, like the K-ABC, has a strong theoretical foundation. It is the Feuerstein Learning Potential Assessment Device (LPAD) (Feuerstein, 1979).

Based upon his theories of mediated learning experience and of deficient cognitive functioning, the LPAD has also utilized Vygotsky's (1978) idea of the zone of potential development. A central focus of this test is the examinee's ability to utilize feedback from the examiner to ameliorate his/her performance. This test, originally constructed for use with retarded popula-

tions, can be utilized with subjects at different levels of performance. This test, unlike many other highly standardized instruments, is administered in a warm, friendly, helpful fashion. There is an attempt to remove anxiety, and the utilization of graded instructions appears to promote optimal testing conditions that reflect "real world" performance.

The LPAD may prove helpful in the assessment of the "culturally deprived" examinee who may show diminished motivation due to past failures. The LPAD endeavors to enhance motivation so as to procure as accurate, valid and reliable information as possible. This instrument also offers a program to assist children in new alternative ways of thinking and problem solving. Feuerstein has developed a program of Instrumental Enrichment designed to provide assistance in coping strategies and alternative educational tactics and techniques. Thus Feuerstein (1980) believes that educational intervention can modify cognitive structures and that training should be provided to maximize one's potential.

Thorndike (1984) has likened intelligence to a computer and has advocated an information processing point of view. His processing perspective encompasses long and short term memory and neuristics as "problem" solving strategies. Thorndike examines the issue of "speed" of information processing as a way to measure cognitive ability. Reviewing Jensen's work on reaction time (neural functioning) and intelligence, Thorndike focuses on the issue of capacity of working memory. Although this author concedes Thorndike's past monumental contributions to psychology,

this latest monograph is disappointingly lacking in new insights into the conceptualizations of intelligence. We all know we process information, but exploration into quantitative and qualitative aspects of processing appears imperative.

Summary and Conclusions:

Many years ago, Gordon Paul (1969, p. 44) asked the question, "What treatment, by whom is most effective for this individual with what specific problem under which set of circumstances and how does it come about?" His question has led to greater precision in psychotherapeutic research. Now a new question must be asked.

"Which I.Q. theoretical perspective, with which test, is most able to help which child, with which problems, in which culture?" The relativity of "I.Q." now appears apparent, particularly as a result of Gardner's work. However, in our culture, with our school system, Sternberg's conception of knowledge acquisition appears to be the most relevant construct. Dohemann and Suhd's work lacks the precision and specificity necessary for empirical test. The Kaufman perspective of sequential/simultaneous processing may stand the test of time, and perhaps more importantly, help children learn more effectively. The K-ABC is currently being researched and utilized extensively in school systems. Training workshops are being offered, in administration, scoring and interpretation of the K-ABC.

In our work with children, we have in the past been over focused on the I.Q. score and have lost the strengths and weaknesses of kids in the interim. Further, by focusing on the I.Q.

score, perhaps we have lost sight of what we were trying to discern. Too often a score was a placement means to an end and a device designed to discriminate children. Perhaps now we will examine what we are looking for in terms of intelligence from a theoretical stance, re-examine the testing procedures to obtain needed information, then utilize that knowledge for instructional purposes.

The implications for teachers, psychologists, and administrators are many. Disagreement as to what "I.Q." is and what "test" to use or believe may be forthcoming. Further, implications for remediation based upon one theory or model may or may not be veridical. Thus, over-investment in one theoretical stance may not be fruitful. As with any testing theory or system, the qualifications of the examiner are critical. The competent administration, scoring, and interpretation of tests is imperative. However, all too often, test manuals are still ignored and tests are often administered without adequate training. For example, the K-ABC examiner

is expected to have a good understanding of theory and research in areas such as child development, tests and measurements, cognitive psychology, educational psychology and neuropsychology as well as supervised experience in clinical observation of behavior and formal graduate level training in individual intellectual assessment (Kaufman and Kaufman, 1983, p. 4).

Thus, only thoroughly qualified clinicians should be using the K-ABC.

As our conceptions of intelligence change, what of our ideation and identification of "giftedness," "creativity," and "talent?" Will the "130 I.Q. or above" construct remain opera-

tional? Clearly, these are challenging times, interesting theories and fascinating perspectives from which to view intelligence, "I.Q.," and giftedness. Hopefully, we will continue to remember the child behind the score and do all we can to help all gifted, talented and creative children maximize their potential.

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